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Reforming State Enterprises in Socialist Economies

Guidelines for Leasing Them to Entrepreneurs

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When state-owned enterprises in socialist economies are reformed by leasing them to entrepreneurs — when the state cannot manage its own enterprise efficiently — how can the state evaluate the effectiveness of reform? By measuring the firm's profit level.

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This paper — a product of the Public Economics Division, Country Economics Department — is part of a larger effort in PRE to understand the transitional problem of state-owned enterprises in socialist economies and to suggest reforms consistent with movement towards a market economy. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Ann Bhalla, room N10-059, extension 37699 (33 pages).

Schjelderup discusses the reform of state-owned enterprises in socialist economies by leasing them to entrepreneurs. He recommends lease payments to the state based on fee schedules from the principal-agent literature.

The aim of the principal (the state) in this literature is to get the agent (entrepreneur/lessee) to act in the state's interest. The state does so by rewarding the agents for observed actions and outcomes.

What is the process of evaluation, however, when the reform process is based on the fact that the state is unable to manage its own enterprise efficiently? Clearly, the state has to rely only on observed outcomes.

Despite the state's inability to evaluate actions, outcomes can be judged by a simple measure: the firm's profit level.

Using the firm's profit level as a basis for sharing rules between the lessee and lessor, Schjelderup offers advice on how to structure

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I would like to take the opportunity to acknowledge those of my colleagues who have helped me write this paper. Without their advice the quality of this work would have been of a considerably lower standard. I would especially like to thank Gunnar Eskeland, Daniel Kaufmann, Emmanuel Jimenez, Fiona Mackintosh, Zmarak Shalizi and Sudir Shetty.

I. INTRODUCTION

Many countries within the socialist world have embarked upon a journey to reform their economic systems. These reforms have been triggered by the aggravation of inefficiencies in the system which have recently led to a decline in economic growth in some countries. One main task in this reform process is the restructuring of the enterprise sector. At the heart of this problem is the transition from centrally planned to autonomous enterprises. Since the state owns the factors of production, new rules of ownership have to be developed that improve efficiency and are politically and socially acceptable.

The enterprise reforms undertaken so far have had as their main objective the increase of efficiency and, hence, productivity in firms which for decades have performed notoriously poorly. This has been sought by moving away from the extremely centralized control of resource allocation to a more decentralized system providing market-like incentives to public enterprises. The system of central planning, defined as detailed physical commands to enterprises and sectors, is to a certain degree being dismantled. Recent indications of this have been reductions both in personnel and in the number of responsibilities of the administrating agencies in several countries. These changes have been backed by legislation on enterprise autonomy. New laws, such as the Soviet law on state enterprises of June 1987, the management system in Hungary

(1985) and the management contracting system in China (1981), have all aimed at enhancing enterprise autonomy by separating management functions from the ownership and regulatory framework of the state. The idea behind this is that autonomous entities are more flexible and have clearer objectives. In accordance with this strategy, the management function of public enterprises has been delegated to such groups as enterprise councils, general assemblies of workers, contract management and shareholder companies (China). To further induce firms to behave like private firms in market economies, bankruptcy laws have been enacted in Hungary (1986) and China (1988). In addition, countries such as Yugoslavia, Poland and the USSR have a number of procedures for the liquidation of enterprises though these are rarely applied in practice.

Despite these efforts, the overall picture is still one in which enterprises are plagued by the inefficiencies that are deeply rooted in the structure of socialist economies. Many critics have claimed that this is because the reforms implemented so far have failed to change the highly centralized and bureaucratic superstructure of these economies. Several authors[1] have recently pointed out some major obstacles still facing the reform process. The most important of these seem to be:

1. The problem of the ownership of assets.
2. Constraints on investment decisions and credit.
3. Price and profit regulations.
4. Soft budget constraints.

1/ See Hewett (1989), Nuti (1989), Nagaoka (1989) and Kochav (1989).

We will investigate these obstacles in detail below to give a background and perspective to the theoretical framework needed to solve these problems.

1. The Problem of the Ownership of Assets. Since the start of the reform process, property rights to assets have created problems in state owned enterprises. As it is now, enterprises are not allowed to own their assets and their autonomy to use resources is still limited. This has meant that they have few incentives to manage and accumulate assets. It seems that the problem is not only one of defining the property rights to assets but also one of defining these in such a manner that they improve the efficiency of enterprises. The experience so far, even in China where experiments with shareholder companies are being conducted, indicates that the separation of ownership and management creates problems in socialist economies. Since western firms seem to be operating more efficiently, it might be useful to draw some parallels.

In western-style enterprises, the board is supposed continuously to represent the owners. Since a board works closely with management and has the power in most cases, to exercise ownership rights, the separation of ownership and management is limited to matters of extreme importance. Whether the board under all circumstances takes decisions that fully reflect the owners' interest is another matter. But what is clear from this organizational structure is that management and ownership rights are relatively well integrated and that this structure produces superior results in terms of productivity. Moreover, boards are made up of large shareholders and businessmen who are rewarded if they perform well and

punished if they fail. The reward and punishment of board members in western enterprises are perceived to happen through reputation effects based on the company's performance in the stock market. Such performance regulates the demand for a board member and is a precaution against irresponsible behavior.[2] Accordingly, the problem of property rights to assets in socialist economies comes down to two factors - first, how ownership is exercised and second, how the management of ownership rights is rewarded. The western way of solving this problem is to integrate management and ownership by delegating ownership rights to boards except in the case of matters of extreme importance. This analysis suggests that ownership rights must be delegated in an appropriate way and combined with an incentive-enhancing reward structure. The way property rights are currently exercised in socialist economies paralyses managerial autonomy.

2. Constraints on Investment Decisions and Credit. The problem of property rights and ownership is further accentuated by the process by which firms have to get approval for their investment decisions. Such regulations are still widespread in almost all socialist economies. Not only does this limit the flexibility of firms but it also makes it difficult for them to plan ahead. In addition, the approval of investment plans is often an excessively long procedure during which their aims are often sidetracked. Since the approving agencies do not have to face the consequences of wrong decisions, there are no incentives to select the most

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2/ For more on the efficiency of boards in western societies, see Meckling and Jensen (1976).

profitable plans. Hence, approval criteria seem to be little emphasized and are subject to corruption. This problem is highlighted by the lack of independent profit-maximizing credit institutions.

3. Price and Profit Regulations. Different ministries and monitoring agencies continue to regulate prices and wages. Although in some cases both wages and prices have been allowed to float freely, the overall picture is of very detailed price and wage regulations. These constraints further dilute the desired autonomy between management and the planning structure, since setting prices freely is one of the most important parameters in a firm's competitive behavior. In addition, profit retention is limited. Though it is reasonable for the state to capture rent from its assets, the benefits from outstanding performance need to be shared in a reasonable way. If this fails to happen, there is no reward for increasing productivity.

The motivation behind many of these regulations seems to be the concern about income distribution. However, wage and price controls are not the best way of handling these problems. Taxes and transfers can accomplish the same goals more effectively. The paradox seems to be that in socialist economies, where planning and monitoring are the foundation of the system, many doubt the ability of the fiscal system to perform such a task.

4. Soft Budget Constraints. Subsidies or soft budget constraints are widespread in the public sector in socialist economies. The reason for this is that loss-making firms cannot easily be terminated because of the

social and political costs involved. However, their presence creates a moral hazard problem since any irresponsible behavior on the part of public enterprises is likely to be forgiven by the government. Hence, they dilute enterprise reform efforts by not inducing management to behave in a proper manner. To correct for this, measures have to be taken that provide incentives to management in their activities.

II. A THEORETICAL FRAMEWORK FOR ENTERPRISE REFORMS.

The experiences of enterprise reforms in socialist economies highlight several problems that seem to obstruct the transition from centrally planned to autonomous enterprises. As we have seen, two of the most difficult tasks appear to be the question of the ownership of assets and how to delegate decision-making to the management of enterprises. In reality, this is the problem of providing incentives to the manager which make him behave responsibly, but which at the same time allow him the flexibility necessary to run the firm in an ever changing environment. This paper finds that the solution to this problem is to lease state owned enterprises to entrepreneurs.

The lease contract will give the lessee the right to manage and retain profits from a specific firm over a certain period of time. One way of viewing this lease contract is as if the lessee is running the firm on behalf of the state. The lessee is responsible for making decisions which are in the state's interest, and in return receives a payment which can be viewed as the profits minus the lease cost. However, it is not certain that the state will receive a lease payment from the lessee. This

will in general depend on the profit of the leased firm. The profit is a function both of the state of the world and of how efficiently the lessee is managing the firm. Therefore, the state has a strong interest in influencing the lessee's behavior to make him act efficiently. This way of looking at a lease contract makes it fruitful to analyze it as a principal-agent problem.

The theory of principal and agent is intended to describe the following problem. An outcome x (for example, profits) depends on actions chosen by an individual, called the agent, as well as on the state of the world. The outcome generates utility to a second individual, called the principal, who, therefore, has a strong interest in the action chosen. It is assumed that the principal and the agent are tied together in some sort of relationship that makes it possible to arrange a contract aimed at controlling the agent's actions. Since actions often cannot be observed, a fee schedule must be defined under which the principal makes a payment to the agent that induces the agent to take actions maximizing the principal's utility (for example, profits).

There are many examples of principal-agent relationships in real life. One such example is the connection between an investment bank and one of its brokers. The broker generates income to the bank through his activities at the stock exchange. This income depends not only on the action chosen, but also on market conditions outside the broker's control. A Black Monday may have catastrophic consequences for the bank's earnings despite good efforts from the broker. In some cases, the general cause of a bad performance is not as obvious as a Black Monday. Under such

circumstances the broker may claim that the state of the world is responsible for the low income whereas the truth is that he was lazy. Hence, there is an informational asymmetry between the two parties that might lead the broker to behave irresponsibly. The solution to this problem demands a special fee schedule from the principal to the agent that provides incentives to the agent to act in the interest of the principal. The fee schedule should be related to the outcome but take into account the uncertainty posed by different states of the world. This is exactly what the theory of principal and agent is meant to do.

There are two reasons for exploring a lease contract as a means to reform state owned enterprises in socialist economies. First, a lease contract viewed as a principal-agent relationship can provide proper incentives for efficient management in a situation where information is not commonly shared and monitoring is costly. Second, a lease contract might be more politically viable since it does not alter the structure of ownership and can, therefore, be easily agreed upon. Moreover, such a contract might be terminated after a period of time and thereby provides easier exit possibilities for the government.

In the following chapters, we examine some of the results from the principal-agent literature to see how they can be applied to a lease contract as a means of improving efficiency in the enterprise sector. Fee schedules that determine the lessee's salary are outlined, and a theoretical as well as practical framework for implementing such fee schedules is developed. In the last chapter, some of the other problems brought up in the introduction are analyzed within a principal-agent framework.

III. THE THEORY OF PRINCIPAL AND AGENT

It is widely recognized among economists that underlying each principal-agent model is an incentive problem caused by some form of asymmetric information. The literature distinguishes between two types. All models where the agent has exclusive precontractual information about his ability or type are labelled adverse selection. We will not deal with these models here but refer to Arrow (1985). In the second category are those models where actions cannot be observed. The unobservability of actions might lead to opportunistic behavior, and these models are, therefore, placed under the heading of moral hazard or hidden actions.

The problem of moral hazard generally leads agents to take actions that are not Pareto-optimal - in other words, if the agent behaved differently, he could have increased the principal's utility without making himself worse off. A natural remedy for this incentive problem is to monitor the agent's actions. But monitoring is often too costly or at best only partly possible, so other solutions have to be found. Therefore, the answer is frequently the arrangement of a fee schedule by a principal to his agent that gives the agent incentives to act in the interest of the principal. For such a schedule to be Pareto-optimal, it must implicitly serve to create appropriate incentives for the agent in his activity and to allocate the risk associated with the outcome of the agent's activity in a way that is satisfactory to both parties.

For the purpose of a lease contract, the problem will be to find a fee schedule as described above. Since this is a survey of the main results from the principal-agent theory, we will not mention a lease contract specifically when discussing the results. However, these results may very well be incorporated into a lease contract where the principal is the lessor and the agent the lessee. Furthermore, the contractual arrangements reviewed below are all the outcome of a one period model. We have omitted dynamic extensions of the basic principal-agent model for several reasons. The improvements that dynamic models offer over a one period model are partly based on a learning effect on the part of the principal from repeatedly evaluating the agent's actions. This learning effect takes time and might, in many cases, require more time than any lease contract is meant to last. Besides, the fact that we do not observe long term relationships or contracts in real life indicates that there are forces at work here that the literature has yet to discover. Interested readers are referred to Hart and Holmstrom (1987) for an introduction to this literature.

(1) The construction of fee schedules.

A central assumption in the principal-agent literature is that both the principal and the agent have identical probability beliefs concerning the state of the world. This may not always be warranted as it might be thought that the principal (the state) in a socialist economy would possess better information on the states of the world. However, since the entire literature is based on the assumption of identical probability beliefs, we have no choice but to accept it.

Another crucial assumption is that the fee schedule can depend only on variables that both parties can observe. It is assumed that the agent chooses his action before the state of the world is known and that he can observe both the outcome and the state of the world. Hence, different possibilities arise only in respect to information available to the principal. It is always assumed that the principal knows the outcome and that the outcome is a function of the action taken and the state of the world. If the principal can observe actions, for example, he can deduce the state of the world from the action taken and its outcome. This reduces the principal-agent problem to two cases of interest:[3]

(1) The principal knows the action.

(2) The principal knows only the outcome.

Case (1) is not a problem of asymmetric information as long as actions can be observed without costs and is, therefore, one of providing incentives given perfect monitoring capabilities. A first best solution to this problem is always found since, in case the agent chooses an inappropriate action, the principal can lower the agent's fee sufficiently to deter such behavior. Fee schedules in this case should be set according to optimal risk sharing with an enforcing constraint that lowers the fee if

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3/ The following section draws heavily on Harris and Raviv (1978), Holmstrom (1979), Shavell (1979) and Rees (1985a).

the agent behaves irresponsibly.[4] In most situations in life, actions cannot be observed so this case seems to be of little relevance. More importantly, even if actions could be observed, fee schedules based on actions could not be used. The reform process is based on the assumption that the state is unable to manage its own enterprises efficiently. Hence, any corrective measures regarding actions from the principal to the agent neglect the reason for leasing. Case (2) is the true hidden action problem where the principal has to construct a fee schedule that provides incentives without the ability to observe actions. Since this problem applies to most cases in real life and can avoid the incompetence of the state to judge actions, we will analyze it in detail.

(2) The principal knows only the outcome.

The aim of this section is to construct a contract between a principal and an agent that shares the outcome resulting from the agent's activity. This contract, which will result in a fee schedule, must serve two purposes at the same time. First, it must insure both parties against income loss due to uncertainty about the state of the world. Second, it has to provide incentives to the agent in his activity. Since the principal cannot observe actions, he has to design a fee schedule that both maximizes his utility and takes into account the agent's response. Provided that the agent receives his reservation utility, he will choose the action that, combined with the fee schedule, maximizes his utility. Unfortunately, the

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4/ For derivation of optimal risk sharing rules see later in this chapter.

solution to the principal's problem is not automatically assured. We will assume that a solution exists to the problem, and for most practical purposes this can be justified.[5]

The agent must choose some action, a, from a given set of actions A. Let θ represent the state of the world drawn from a distribution Δ. The state of the world and the agent's action jointly determine a verifiable outcome $\pi=\pi(a,\theta)$. We can think of this outcome as some sort of monetary payoff which belongs to the principal. The agent's choice of a makes π a random variable whose distribution is derived from Δ via $\pi=\pi(a.\theta)$. We will denote this distribution $f(\pi,a)$. The principal's problem is now to define a contract under which the principal makes a payment, $s(\pi)$, to the agent that induces him to take the desired action.

It is assumed that the agent has an additive separable utility function, $U(s(\pi),a) = U(s(\pi)) - c(a)$. The principal's utility is $V(\pi - s(x))$. The problem can now be stated as:

(1) $\quad \text{Max} \int V(\pi - s(x))f(\pi,a)d\pi \qquad$ over all $a \in A$, $\quad s(\cdot) \in S$.

subject to:

(2) $\int U(s(\pi))f(\pi,a)d\pi - c(a) \geq U^{o}$.

(3) $\int U(s(\pi))f(\pi,a)d\pi - c(a) \geq \int U(s(\pi))f(\pi,a')d\pi - c(a')$, all $a \in A$.

5/ See Grossman and Hart (1983).

The first constraint requires that the agent is rewarded with a fee which is higher than his reservation utility level U^o. This utility level could be interpreted as his alternative wage. In a socialist economy, the alternative wage for an agent would be the average salary for workers in the public sector with comparable skills. The second constraint assures that the agent behaves rationally given the incentive scheme. Put differently, for a given fee schedule, the agent will choose his action so as to maximize his own utility.

It is well known from the theory of principal and agent that the reward scheme resulting from this maximization problem depends upon attitude to risk. For our purposes, it is natural to assume that the principal is always risk neutral since the state can be assumed to hold a well diversified portfolio. We will, therefore, only examine fee schedules where the principal is risk neutral and the agents are either risk neutral or risk averse. Moreover, we will not go into further detail with the mathematical solution to the above maximization problem,[6] the reason being that this is a rather technical process which defies the intention of this paper. We will, therefore, proceed by stating the results of the problem with respect to attitude to risk.

6/ For a more technical derivation of these schemes, see, for example, Grossman and Hart (1983) or Rees (1985).

Risk neutral agent. It is instructive to examine the two aspects of a contract, risk sharing and the provision of incentives, separately. The problem of optimal risk sharing is treated in the literature by fixing the agent's action arbitrarily and then maximizing the principal's utility for some given level of the agent's utility. Hence, the fee schedule derived from this is not intended to provide incentives since any action can be chosen. The maximization merely states how the fee schedule should be structured to account for uncertainty and at the same time to induce the agent to stay in the relationship.

The result of this maximization problem is known from Borch (1962) which is that the principal and the agent's marginal rates of substitution between any two states are equal. Hence, the fee will depend upon attitude to risk. Optimal risk sharing with a risk neutral agent results in a fee scheme where the agent receives the outcome minus a constant, which is the principal's share. By allowing the agent the outcome minus a constant, the agent will maximize the expected net return since he bears all the costs of his actions and is risk neutral. Hence, he can act on behalf of the principal as a perfect insurer against the risk of variation in income.

The problem we are studying here is the necessity to provide simultaneously both risk sharing and incentives to the agent in his activity. Hence, the task of providing incentives might alter the fee schedule described above. However, risk neutrality combined with the optimal risk sharing scheme leads the agent always to choose the optimal action which, therefore, mitigates the problem of moral hazard. It is often stated, therefore, that information has no value since, even if

actions could have been perfectly monitored, the resulting information would not alter the structure of the contract. A different way of phrasing this is to say that a contract which specifies a fee that is contingent only on outcome is at least as good as one which makes the fee contingent on the action and the state of the world in addition to the outcome.

Risk averse agent. If the agent is risk averse, the problem is more complex because some risk sharing benefits have to be sacrificed to provide the agent with the right incentives. Suppose that the agent were to receive the outcome minus a constant. This fee schedule would subject him to risk regarding the state of the world, given the action chosen. Hence, optimal risk sharing is not achieved. On the other hand, if he were given a fixed fee, this would leave him with no incentive to take the right action. Hence, a trade-off has to be made between providing incentives and optimal risk sharing. Such a fee schedule would make the fee depend to some extent on the outcome, but it would not require the agent to bear all the risk. We can envisage such a fee schedule as being composed of a fixed fee combined with a bonus that varies with the outcome. The question arises as to whether the sharing rule has any particular shape, for example, linear. The answer is no. In fact, almost any shape is consistent with the second best solution as long as the fee depends to some extent on the outcome. However, linear schemes of the type $C + \alpha\pi$, where C would be a 'basic salary' and α a fixed profit share bonus, are preferable to other schemes. There are several reasons for this.

First, linear sharing rules are easy to construct and less costly than intricate contracts relying on several different scenarios. Second, and more important, incentive schemes need to perform well across a wide range of events not specified in the general solution to the principal-agent problem. Hence, the sharing rule in use needs to be robust. One way of allowing for such robustness is to allow the agent a richer set of actions. If the agent faces several options, intricate schemes trying to account for them all will perform poorly. Linear schemes are best suited since they allow the agent to explore all options without reducing the performance of the incentive scheme. We will, therefore, use a linear sharing rule. The fee schedule when the principal knows only the outcome is summarized below:

THE STATE KNOWS ONLY THE OUTCOME (π)	FEE SCHEDULE
RISK NEUTRAL AGENT	THE OUTCOME (Π) MINUS A CONSTANT(C) $\rightarrow \Pi - C$
RISK AVERSE AGENT	A CONSTANT (C) PLUS A BONUS (α) VARYING WITH THE OUTCOME (Π) $\rightarrow C + \alpha\Pi$, $0 < \alpha < 1$.

Imperfectly observable actions. Suppose now that there exists a variable, y, which is correlated with the agent's action and, hence, provides imperfect information about the agent's actions. The question is whether such information should be incorporated into a contract. It is not obvious that such information is of any value. The use of information like this introduces a new risk to the agent that the fee might reflect an inaccurate perception of the agent's true action. If the principal is risk averse too, this risk would be undesirable for him as well.

Risk neutral agent. It can be shown that if the agent is risk neutral, his fee will depend on the outcome alone - in the way described above. As expected, further information has no value.

Risk averse agent. It can be shown that if the agent is risk averse, his fee schedule will always depend to some extent on information which the principal has about his actions. The fee will, therefore, consist of one fixed part plus a bonus varying with the information about the value of the action taken as well as the outcome. However, in the case of a risk averse agent, a first best Pareto-optimum is not achieved. The reason for incorporating information like this into the contract is because it presents a more discriminatory way of providing the agent with incentives to increase his level of effort. To understand why, an example is in order.

Assume that the variable y is not taken into account and suppose that the agent chooses the optimal action but that the state of the world turns out badly, resulting in a low outcome. The principal might be led to believe that the low outcome is caused by the agent's action. Hence, he makes a low payment to the agent. Conversely, in the case of a high outcome, a correspondingly high payment could be made to the agent, even though the agent had provided a low level of effort. Each of these possibilities is clearly undesirable in terms of providing incentives to the agent. By introducing an imperfect indicator such as y, one reduces the risk of rewarding a low value action and penalizing a high value action. It can be shown that this improvement in the contract is

sufficient to outweigh whatever costs arise due to the extra uncertainty imposed by imperfect monitoring. The result of imperfect monitoring can be treated as a special result of case (2) and is summarized below:

IMPERF. OBSERVABLE ACTIONS	THE FEE SCHEDULE
RISK NEUTRAL AGENT	THE OUTCOME MINUS A CONSTANT
RISK AVERSE AGENT	A CONSTANT PLUS A BONUS VARYING WITH THE INDICATED ACTION AND THE OUTCOME

IV. THE IMPLEMENTATION OF LEASE CONTRACTS

In the following, we will concentrate on the fee schedule where the principal cannot observe the agent's actions. This is the most realistic case and requires the specification of three factors, the agent's attitude to risk, what is meant by outcome and how to specify the parameters (C,α) in the fee schedule.

Establishing what is meant by outcome. Since this paper is an extension of the principal-agent literature in the sense that the principal is the state and the agent is a lessee managing a state owned enterprise, the outcome should be some measure of social welfare. Accordingly, the agent's fee schedule should maximize expected social welfare, subject to the incentive constraint of the agent. However, since such a welfare function varies between countries and in addition might be difficult to establish, a social welfare function containing several parameters seems to be of little practical use. Instead, we will argue that the welfare function to be maximized should contain only one parameter, the profit of

the firm. There are three reasons for this. First, to maximize the profit of the firm is in the interest of both parties since their income from the lease depends upon the level of profit. Second, we know from micro-theory that profit-maximizing behavior leads to the efficient use of input factors. This is so only when prices reflect resource scarcities. In a socialist economy this is not the case. The problem can be overcome by subjecting the firm to border prices or if they exist, market prices on input factors, and in addition, allowing the firm to set prices on final goods freely. Third, the profit of the firm is easily monitored and hard to manipulate. To limit the possibility of such manipulations, only the return from entrepreneurship or pure profits should be considered to be the outcome. If other less pure profit measures are taken into account, they might obscure the goal of the firm and distort its behavior.

Setting the size of the parameters in the fee schedule. Once the outcome is defined, the parameters in the fee schedule are ready to be specified. Constants and sharing parameters have to be set. This is, in reality, a question of economic rent. The parameters in the fee schedule should be the result of a strategy that maximizes the principal's revenue from leasing. Moreover, the principal should object to any scheme that renders him less rent from the enterprise than if it was managed by himself. We will argue that the optimal strategy for this purpose is an auction with reservation prices on the parameters in the fee schedule that determine the principal's income from leasing. These reservation prices should be based on the return that the firm already yields to the state. If no lessee is willing to pay a higher price for a lease contract than this, then the state is better off managing the firm itself. However, to reveal what value the market puts on the lease, an auction should be held.

The justification for applying auctions to this problem, even if there is only one bidder, has to do with the special type of informational asymmetry encountered. Because the principal does not know how much the potential lessees value the contract, posting a 'price' is not optimal, especially if the supply of contracts is constrained. Such a price does not exploit the fact that some lessees might be willing to bid more before the principal hits the capacity constraint. Organizing an auction is, therefore, the best solution because the participants will reveal through the bidding process how much they value the contract.

The question now is how such an auction should be conducted. Our problem resembles that of a common value auction. In a common value auction, the realized value of a lease is the same for all bidders, but bidders may have differing estimates ex ante of the common value. The seller in our auction, the principal, has a strong bargaining position. Not only does he have the power to decide the supply of leases, but he can select any institution he likes for conducting trade. The optimal strategy for a seller in such a strong bargaining position[7] is to make a take it or leave it offer to the highest valuation buyer that extracts all the surplus from him. However, the success of this strategy depends on the seller's ability to extract information about valuation from the buyer. The existence of private information makes such a task difficult. Hence, the seller has to find a strategy that captures as much as possible of the bidder's valuation, given this asymmetry of information. Furthermore, if there are several bidders, they may have collusive arrangements among

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7/ See Milgrom (1987).

themselves. It is known from the theory of auctions that a sealed bid auction is the superior institution for eliminating this problem as collusion is harder to sustain when secret price concessions are possible.

The information problem encountered in connection with auctions like this often has a dynamic character. For example, after the lease is signed, new information may be revealed or conditions existing at the time of the auction might have changed. Such changes can seriously affect one or both of the parties involved. This is really the question of duration of the lease contract. In China, lease and management contracts are renegotiable when price restraints determining reward to management are lifted. This is important when the economy is rapidly being reformed and prices and price regulations change. We will not treat this problem in detail since it has to be dealt with on a case to case basis. However, it is clear that the instability of an economy which is in the process of being reformed makes even medium term relationships very difficult. Therefore, to allow flexibility, the auction should be held on the condition that it will be possible to renegotiate on variables vulnerable to changes which are under the government's control.

Asymmetric information in auctions of common value has an additional twist since winning the auction is itself an informative event. The bidder with the largest bid must conclude from the fact that he won that the other participants obtained lower estimates of the common value than he did. This should make him revise his estimate of the value of the contract downwards. In reality, this is an adverse selection problem, and it is called the winner's curse. This adverse selection problem is a

function of how many participants there are in the auction as well as of the degree of uncertainty. If the number of bidders is increased, each participant will tend to bid more aggressively. The reason for this is that, with a greater number of rivals, there is less room to mark up bids relative to cost estimates and still win the auction. Given some uncertainty about the value of the object auctioned, this increases the likelihood of a winner who overestimates the object. Hence, the higher the number of bidders, the greater the adverse selection problem. However, the release of private as well as public information may help reduce the adverse selection problem, as bidders utilize the additional information to avoid the valuation errors which underlie the winner's curse.

Even though the theory of auctions has long traditions, much further work needs to be done before the literature is capable of handling all possible problems that might arise. In common value models such as ours, it is the equilibrium of the first-price sealed bid auction that has been studied most extensively.[8] We do also know that first-price sealed bid auctions with a minimum price are applied for oil leases by the U.S government for the outer continental shelf.[9] The minimum price is in line with our discussion above, and the sealed bid indicates that collusion otherwise might be a big problem. This does not, however, guarantee that a first-price sealed bid auction is what is appropriate in this case.

8/ Milgrom (1979), Milgrom and Weber (1982), Reece (1978), Kagel and Levin (1986).

9/ Hendricks, Porter and Boudreau (1987).

The problem of determining attitude to risk. The problem of revealing the agent's attitudes to risk can be solved by letting the agents pick the fee schedule by which they want to be rewarded. Since a risk averse agent would be worse off by selecting a scheme designed for a risk neutral agent and vice versa, an agent always has the incentive to reveal his true nature and select the right scheme.

Even though the discussion above has in principle solved many of the problems attached to the implementation of a lease contract based on a principal-agent incentive scheme, it is worth examining the fee schedule itself in further detail to see more specifically how it should be implemented.

Implementation of the fee schedule. Let π now denote pure profits. It is instructive to write the fee schedule again and to examine it in more detail.

THE STATE KNOWS ONLY THE OUTCOME (π)	FEE SCHEDULE
RISK NEUTRAL AGENT	THE OUTCOME (Π) MINUS A CONSTANT(C) $\Rightarrow \Pi - C$
RISK AVERSE AGENT	A CONSTANT (C) PLUS A BONUS (α) VARYING WITH THE OUTCOME (Π) $\Rightarrow C + \alpha\Pi, \quad 0 < \alpha < 1.$

From the table, it is clear that the principal has to solve at least three problems. First, the agent has to reveal his attitude to risk. As pointed out above, this is done by presenting him with the two

alternative schemes and letting him choose. Second, the parameters (α,C) in the two schemes have to be specified. The sizes of α and C depend on the agent's attitude to risk.

If the agent is risk neutral, the principal's lease payment is determined by C. Any level of C that is below the rent presently extracted from the enterprise is not acceptable. Hence, only bids that exceed this reservation level of C will be considered. The winner is the highest bidder. If the agent is risk averse, then the principal's lease payment is determined through the outcome minus the agent's fee: $\pi - C - \alpha\pi = \pi(1 - \alpha) - C$. From the equation, we see that the level of C and α determines the lease payments. The question now is how to find the principal's reservation level for these parameters. Again, the principal should object to any solution that renders him less rent from the enterprise than if it was managed by himself. Hence, α and C should be set so that the expected size of the principal's lease income equals the rent presently extracted from the firm. The bidder who offers the principal the highest expected lease payment wins.

Finally, a problem arises if there are several agents who want to become the lessee and they have different attitudes to risk. The winner of such an auction is again the bidder who offers the principal the highest expected lease payment. Since we have assumed that the principal is risk neutral, the two schemes can be compared.

V. INSTITUTIONALIZING ENTERPRISE REFORMS BASED ON A PRINCIPAL-AGENT RELATIONSHIP

This paper attempts to reform state owned enterprises by leasing them to entrepreneurs. It specifies lease payments to the state based on fee schedules from the principal-agent literature. The aim of the principal (the state) in this literature is to get his agents to act in his interest. He does so by rewarding the lessees according to observed actions and/or outcomes. However, since the reform process is based on the fact that the state is unable to manage state owned enterprises efficiently, the principal (state) must rely only on observed performance as measured by the pure profit level of the firm. To implement the sharing rules between the lessee and the lessor, auction theory is used. More specifically, a first-price sealed bid auction with reservation prices is recommended.

The reason for using principal-agent theory in the setting of enterprise reform is because it has several desirable qualities. Among these is the ability to delegate responsibility in an efficient way. As mentioned in the introduction to this paper, some problems seem to be more burdensome in the context of enterprise reform than others. In the following, we will discuss these explicitly within a principal-agent framework.

The problem of ownership of assets. Experience makes it clear that, because public enterprises do not own their own assets, they have no incentive to accumulate and manage those assets as they are not rewarded

for doing so efficiently. The question of the ownership of assets is in reality a principal-agent problem. Any authority representing the state must be given incentives to duplicate the state's interest. This is exactly why lease payments are derived from the principal-agent theory. Hence, these fee schedules are the ideal solution to the problem of the ownership of assets. There is no need for any other authority to represent the state.

It is worth stressing that the lessee subject to the outlined fee schedules is the best authority to manage the firm's assets. Any other authority, such as a board, is nothing but an agent for the state, and an inefficient one. Hence, there is no need for a board if the management acts as an agent.

One problem that is prone to arise regardless of who is acting as an owner on behalf of the state is that the agent always has an incentive to sell assets to increase the firm's profits and thereby his fee. This must be countered by not allowing such sales to have an impact on the derivation of the fee schedules. Since such sales can easily be monitored, this rule can be enforced despite any informational asymmetry between the principal and the agent.

Budget and credit constraints. The elimination of loss-making firms is one of the main purposes of an enterprise reform. However, loss-making firms can be made profitable again. This can be done by changing the incentive structure that governs these firms through leasing arrangements. However, this task might take time and require investment.

Let us first consider the aspect of time. Even after a lessee has taken over an enterprise, the firm may still make losses. The question is whether the state should let the lessee continue to manage the firm. Since it is uncertain whether the losses can be converted to profits over time, the government has two options. First, it can give the lessee a second chance, recognizing that there might be some learning effect or unlucky circumstances involved. This strategy involves giving the lessee credit either to cover his losses or to reinvest. Second, the government can evaluate the lessee strictly by his performance. In this case, the government should base its action on the alternative value of the firm. This value can either be represented through another lessee or by the state running the firm by itself.

The investment requirements needed for a reform process are, by definition, not known to the state. Any potential lessee will calculate these costs and make his bid for the contract according to the expected reward. The lessee's investment plans necessitates that funding be made available. We will argue that this should be done through a private credit market to ensure an efficient allocation of capital. A privately governed credit market must itself bear the burden of unprofitable projects and has, therefore, the strongest incentives to evaluate the risks of lending. Furthermore, only through a market based process of demand and supply can the opportunity cost of capital be properly assessed. Both these arguments should make it clear that any reform process concerning public enterprises must be supported by some market based banking system.

Price and wage regulations. The price regulations still existing in many socialist economies distort the real cost of resources and create artificially profitable firms. Any serious reform efforts must realize that prices are supposed to reflect the relative scarcity of factors and are, therefore, at the core of the reform process. However, the widespread use of price regulations can probably not be done away with instantaneously. As pointed out above, this obstacle must be countered by charging leased enterprises border prices on input factors and allow prices on final goods to be set freely.

CONCLUSION

The above analysis tries to reform loss making state owned enterprises in socialist economies. Since the state has proven to be incompetent in its management of state owned enterprises a new structure must be found that takes into account the incompetence of the state but ensures that the state's economic interests are preserved the best way possible. Two of the most difficult tasks in this process is how to exercise ownership rights to assets and simultaneously delegate decision making to the management of the firm. The paper finds that the solution of these problems is to lease state owned enterprises to entrepreneurs through contracts derived from the principal-agent literature where the state is the principal and the agent is the lessee.

Contracts based on principal-agent relationships are designed to provide incentives for hirelings who cannot be observed during their performance. The informational asymmetry necessitates a contract based on

observable outcomes under which the hireling's supervisor makes a payment to the hireling that induces him to take actions leading to the wanted outcome. Since the state needs to delegate responsibility to the management of state owned enterprises, the process of reform becomes in reality a principal-agent problem. By leasing state owned enterprises to entrepreneurs, and subjecting them to fee schedules derived from the theory of principal and agent, state owned enterprises can be managed efficiently. As shown above, by tailor making these fee schedules, the lessee will implicitly be given incentives to exercise property rights efficiently. Moreover, a lease contract has the advantage that it may be more viable politically since it does not alter the structure of ownership and can be easily terminated.

The main problem attached to the use of principal-agent contracts to reform state owned enterprises is that contracts must be defined to evaluate the performance of state owned enterprises based on some neutral measure not affected by the state's incompetence. The paper claims that the incompetence of the state to evaluate actions does not obstruct the finding of such as measure, and that this measure is the profit level of the firm. There are three reasons for using the profit level of the firm. First, maximizing the profit of the firm is in the interest of both the state and the lessee since their income from the lease depends upon the level of profit. Second, we know from micro-theory that profit maximizing behavior leads to an efficient use of input factors. In a socialist economy, this may pose a problem since prices do not necessarily reflect resource scarcities. The problem of price distortions can be overcome by

subjecting the firm to border prices or if they exist, market prices on input factors and simultaneously allowing the firm to set prices on final goods freely. Third, the profit of the firm can be monitored and provided good control mechanisms is hard to manipulate.

To facilitate the reform process it is necessary to establish a credit market because the lessee may have investment plans that need to be financed. To ensure that capital is efficiently allocated, the opportunity cost of capital must be determined in a market created by supply and demand forces.

So far no country has yet tried to implement lease schemes based on principal-agent contracts. Some efforts, however, such as in China, have come very close to derive systems of reward in public enterprises that look surprisingly much alike what the theory of principal and agent suggests. Future work needs to build a bridge between theory and reality to see whether they both can benefit from the interaction.

REFERENCES

Arnott, R. and Stiglitz, J.E. (1986) "Moral Hazard and Optimal Commodity Taxation" Journal of Public Economics, Vol. 29. pp. 1-24.

Arrow, K. (1985). "The Economics of Agency" In J. Pratt and R. Zeckhauser (eds.), Principals and Agents: The Structure of Business, pp. 37-51, Boston, Harvard Business School Press.

Alchian, A. and Demsetz, H. (1972) "Production, Information Costs, and Economic Organization" American Economic Review, Vol. 62.

Banerjee, A. and Besley, T. (1986) "Moral Hazard, Limited Liability and the Corporate Tax" Nuffield College, Oxford, Discussion Papers in Economics (U.K.) No. 8, pp. 1-36.

Borch, K.(1962). "Equilibrium in a Reinsurance Market" Econometrica, Vol. 30, No. 3, pp. 424-44.

Engelbrecht-Wiggans, R., Shubik, M. and Stark. R.M. (1983) Auctions, Bidding, and Contracting: Uses and Theory., New York University Press.

Grossman, S.J. and Hart, O.D.(1983) "An Analysis of the Principal-Agent Problem" Econometrica, Vol. 51, No. 1, pp. 7-45.

Harris, M and Raviv, A. (1979). "Optimal Incentive Contracts with Imperfect Information" Journal of Economic Theory, Vol. 20, pp. 231-59.

Hart, O. and Holmstrom, B. (1987) "The Theory of Contracts" in T. Bewley, Advances in Economic Theory - Fifth World Congress, Cambridge University Press.

Hendricks, K., Porter, R.H. and Boudreau, B. (1987). "Information, Returns, and Bidding Behavior in OCS Auctions" Journal of Industrial Economics, Vol. 35, pp. 517-42.

Hewett, E.D. (1989) "Economic Reform in the USSR, Eastern Europe, and China: The Politics of Economics" American Economic Review, Papers and Proceedings. pp. 16-20.

Holmstrom, B. (1979). "Moral Hazard and Observability" Bell Journal of Economics, Vol. 10, pp. 74-91.

Holmstrom, B. (1982). "Moral Hazard in Teams" Bell Journal of Economics, pp. 324-340.

Holmstrom, B. and Milgrom, P. (1987) "Aggregation and Linearity in the Provision of Intertemporal Incentives" Econometrica, Vol. 55, No. 2, pp. 303-328.

Jensen, M.C. and Meckling, W.H (1976) "The Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure" Journal of Financial Economy, pp. 306-60.

Kagel, J.H. and Levin, D. (1986) "The Winners Curse and Public Information in Common Value Auctions" American Economic Review, Vol. 76, pp. 894-920.

Kochav, D. (1989) "Enterprise Management Reform - Issues and Options" World Bank Yellow Cover report, China Industry and Finance Operations Division.

Lipsey, R.G. and Lancaster, R.K. (1956/57) "The General Theory of the Second Best" The Review of Economic Studies, pp. 11-33.

Milgrom, P.R. (1979) "A Convergence Theorem for Competitive Bidding with Differential Information" Econometrica, Vol. 47, pp. 679-88.

Milgrom, P. (1987) "Auction Theory" in T. Bewley, Advances in Economic Theory - Fifth World Congress, Vol. 10, pp. 1-33.

Milgrom, P.R. and Weber, R.J (1982) "A Theory of Auctions and Competitive Bidding." Econometrica, Vol. 50, pp. 1089-122.

Mirrless, J.A. (1974) "Notes on Welfare Economics, Information and Uncertainty", in Balch, McFadden and Wu (eds.), Essays in Economic Behavior under Uncertainty, Amsterdam, North Holland Publishing Co.

Nagaoka, S. (1989) "Reform of Ownership and Control Mechanisms in Hungary and China" The World Bank Industry and Energy Department, Industry series paper No. 7.

Nuti, D.M. (1989) "Perestroika: Transition from Central Planning to Market Socialism" Economic Policy, pp. 354-389.

Phlips,L. (1988) The Economics of Imperfect Information, Cambridge University Press

Reece, R. (1978) "Competitive Bidding for Offshore Petroleum Leases" Bell Journal of Economics, Vol. 9, pp. 369-84.

Rees, R. (1985a) "The Theory of Principal and Agent: Part I" Bulletin of Economic Research, Vol. 37, pp. 3-27.

Rees, R. (1985b) "The Theory of Principal and Agent: Part II" Bulletin of Economic Research, Vol. 38, pp. 75 -95.

Weitzman, M. (1982) "The New Soviet Incentive Model" Bell Journal of Economics.

World Bank Report No. 6736-POL (1987) "Poland: Reform, Adjustment and Growth" (Grey cover report.)

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